Perceptual and Motor Skills, 1990, 71, 915-918. © Perceptual and Motor Skills 1990

USE OF MICROCOMPUTERS BY YOUNG CHILDREN WITH SEVERE DISABILITIES: A BRIEF REVIEW OF STUDIES AND THEIR IMPLICATIONS[1]

HOWARD P. PARETTE, JR. AND ALAN VANBIERVLIET

University of Arkansas at Little Rock

Summary.—Microcomputers increasingly are being employed with young children having disabilities, although little research has been conducted. A review of available research suggests a variety of questions must be addressed by professionals in rehabilitation to optimize potential applications of this new technology with these children.

The dramatic increase in the development of microcomputers has far reaching implications in our society, particularly for persons with disabilities. Use of microcomputers can greatly enhance the quality of life for these individuals, facilitating greater interaction and control over the environment (1, 5). For young children with disabilities, the promise of this use remains uncertain (14) though growing optimism has been expressed for expanded use of microcomputers, especially with young children who have severe disabilities (7). Reviews of applications with young disabled children have been reported (13), but little attention has been given to those who are very young and have severe disabilities (12).

A review was conducted of the psychological and rehabilitation literature during the past decade to ascertain the extent to which use of microcomputers with young children with severe disabilities has been reported. These studies have been grouped by areas, and implications for professionals are addressed.

Preferences and Choice Making Through Environmental Control

The use of microcomputers as tools for environmental control by infants and young children with disabilities is a relatively new area of research. Important work on contingency intervention has been described by Brinker and Lewis (3, 4). In one study (4), 21 infants with disabilities and of ages 3 mo. to 4 yr. learned cause and effect relationships using an adapted environmental control system. Employing a system which permitted recording of eight switch activations per minute that triggered up to eight output contingencies, these investigators recorded different body movements and choices made by the children. The children learned to control the consequences in their environment, and they systematically varied their body movements to explore specific contingencies. This study illustrated how microcomputers could be used to facilitate choice-making and to indicate preferences by very young disabled children (10).

---

[1] Address correspondence to H. P. Parette, Jr., University of Arkansas at Little Rock, Center for Research on Teaching and Learning, 2801 S. University, Little Rock, AR 72204.

Behrmann and Lahm (2) studied five children with multiple disabilities. They were ages 11 to 27 mo. The purpose concerned the possibility of teaching environmental control beyond initial understanding of cause and effect. Environmental objects were controlled through switches interfaced with a computer. This system incorporated speech synthesis, switches, graphic representations of objects, and gradually increasing difficulty for selecting and activating an object using scanning. The electronic scanning used a pointer that could be moved from item to item in an array and activated a switch when the pointer was placed on the desired item. In this study the children exhibited an understanding of the relationship between their actions and selections of preferred toys in their environment. None of the children, however, mastered the scanning process.

Using single-subject research designs, Lahm (9) examined the choice-making with Choicemaker I (8) by children with multiple disabilities and of mental ages 8 to 36 mo. This computer program was an 8-level teaching sequence designed to teach young children environmental control choices. Improvement appeared on all four performance variables of independence, latency, accuracy, and practice, although improvement was not always strong enough to infer that the software was the sole agent of behavior change. Three children did not meet the accuracy criterion for advancement beyond the third level of the program. As noted by Behrmann and Lamb (2), electronic scanning was a very difficult skill to learn.

Motor Development

Horn and Warren (6) investigated the effects of a combined neuromotor/behavioral approach on learning basic motor skills. Two children ages 17 and 24 mo. with severe and multiple disabilities were provided basic motor training using a microcomputer-mediated teaching system. A research design provided multiple probes across behaviors; the researchers observed that the frequency and duration of target behaviors increased during training and generalization tests. The microcomputer was a useful adjunct for the teacher, although a considerable amount of teachers' time was required.

Language Development

O'Connor and Schery (11) examined the learning of vocabulary and its use and change in social and communication behaviors of eight toddlers with severe handicaps (mean age = 29 mo.) under two different language conditions—a computer-based approach and traditional intervention procedures. After about 4 mo. of treatment, gains in language acquisition were made by both groups of children which indicated that change in language by these toddlers was facilitated by use of the computer-based instruction.

Implications for Research

The few research studies identified support the hypothesis that use of microcomputers can enhance learning by young children with severe disabilities. Recent federal legislation including P. L. 99-457, the *Education of the Handicapped Amendments of 1986*, P. L. 100-407, the *Technology-related Assistance for Individuals Act of 1988*, and P. L. 101-239, the *Omnibus Budget Reconciliation Act of 1990* provide financial and technical support for the use of microcomputers. Although microcomputers can be used to increase independence and improve the quality of life for young children with severe disabilities, we do not know how to apply what is known about computers to these children's development. Our understanding of effective habilitation strategies for young children with severe disabilities is limited.

Some of the most pressing research issues regarding the use of microcomputers with young children concern access techniques, instructional strategies, and the integration of microcomputers into therapeutic and instructional programs. Older students and adults with severe disabilities frequently use electronic scanning to access computers. Effective strategies for teaching young children to scan or to develop alternative techniques are needed. Many questions need to be answered: what are effective visual displays, how may sound and animation be used, and what approaches to organizing and sequencing instructional components are likely to be successful. For microcomputers to gain acceptance, researchers must develop and apply effective models for integrating their use into therapeutic programs and instructional curriculums.

REFERENCES

1. Behrmann, M. M., Jones, J. K., & Wilds, M. L. (1989) Technology intervention for very young children with disabilities. *Infants and Young Children*, 1, 66-77.
2. Behrmann, M. M., & Lahm, L. (1983) Technology and handicapped babies: the future is now. *Communication Outlook*, 5, 4-6.
3. Brinker, R. P., & Lewis, M. (1982) Discovering the competent handicapped infant: process approach to assessment and intervention. *Topics in Early Childhood Special Education*, 2, 1-16.
4. Brinker, R. P., & Lewis, M. (1982) Making the world work with microcomputers: learning prosthesis for handicapped infants. *Exceptional Children*, 49, 163-170.
5. Cain, E. J., & Taber, F. M. (1987) *Educating disabled people for the 21st century*. Boston, MA: Little, Brown.
6. Horn, E. M., & Warren, S. F. (1987) Facilitating the acquisition of sensorimotor behavior with a microcomputer-mediated teaching system: an experimental analysis. *Journal of the Association for Persons With Severe Handicaps*, 12, 205-215.
7. Kangas, K., & Loyd, L. (1988) Early cognitive skills as prerequisites to augmentative and alternative communication use: what are we waiting for? *Augmentative and Alternative Communication*, 4, 211.
8. Lahm, E. A. (1985) *Choice Maker I.* Fairfax, VA: Microcomputer Systems for the Handicapped. (Computer program)
9. Lahm, E. A. (1988) Software designed to teach young multiply handicapped children to use the computer for controlling their environment: a validation study. *Dissertation Abstracts International*, 49, 788-A. (Order No. DA8808318)

10. LAHM, E. A. (1989) *Technology with low incidence populations: promoting access to education and learning.* Reston, VA: Center for Special Education Technology.
11. O'CONNOR, L., & SCHERY, T. K. (1986) A comparison of microcomputer-aided and traditional language therapy for developing communication skills in nonoral toddlers. *Journal of Speech and Hearing Disorders,* 51, 356-361.
12. PARETTE, H. P., JR., & VANBIERVLIET, A. (1990) The future of microcomputer applications for young children with disabilities. In J. J. Presperin (Ed.), *RESNA '90: capitalizing on technology for persons with disabilities.* Washington, DC: RESNA Press. Pp. 133-134.
13. WATSON, J. A., CHADWICK, S. S., & BRINKLEY, V. M. (1986) Special education technologies for young children: present and future learning scenarios with related research literature. *Journal of the Division for Early Childhood,* 10, 197-208.
14. WATSON, J. A., NIDA, R. E., & SHADE, D. D. (1985) Educational issues concerning young children and microcomputers: Lego with Lego? *Early Child Development and Care,* 23, 299-316.

Accepted October 15, 1990.